CLAIMS

1. A method for data scrambling or descrambling modulated signals, where s_i represents the scrambling code, S represents Q symbols with i being odd and I symbols with i being even, comprising the steps of:

(a) if de-scrambling the modulated signals and if $B \leq |S|$, then S = sign (S) * $|B - \Delta|$, where Δ is a small non-negative number,

(b) determining if $s_i = 1$, for $i = 0,1$, if i>1 skip to step (d);

(c) setting S = -S if in step (a) $s_i = 1$, else setting S = S; and

(d) determining if $s_i = 1$, for $i \geq 2$ and if $A \leq |S| < B$,

letting S = sign (S) * $|(A + B) - |S||$, else S = S; and

where:

A = 0, B = $2D_1$ for i = 2, 3;

A = 0, B = D_1, and A= D_1, B = 2 D_1 for i = 4, 5;

A = 0, B = $D_1/2$; A= $D_1/2$, B = D_1; A= D_1, B = $3D_1/2$; A = $3D_1/2$, B = $2D_1$, for i = 6, 7, etc.

2. A method for data scrambling or de-scrambling modulated signals, where s_i represents the scrambling code, S represents Q symbols with i being even and I symbols with i being odd, comprising the steps of:

(a) if de-scrambling the modulated signals and if $B \leq |S|$, then S = sign (S) * $|B - \Delta|$, where Δ is a small non-negative number,

(b) determining if $s_i = 1$, for $i = 0,1$, if i>1 skip to step (d);

(c) setting S = -S if in step (a) $s_i = 1$, else setting S = S;

(d) determining if $s_i = 1$, for $i \geq 2$ and if $A \leq |S| < B$,

letting S = sign (S) * $|(A + B) - |S||$, else S = S; and

where:

A = 0, B = $2D_1$ for i = 2, 3;

A = 0, B = D_1, and A= D_1, B = 2 D_1 for i = 4, 5;

A = 0, B = $D_1/2$; A= $D_1/2$, B = D_1; A= D_1, B = $3D_1/2$; A = $3D_1/2$, B = $2D_1$, for i = 6, 7, etc.

3. A method for data scrambling or descrambling modulated signals, where s_i represents the scrambling code, S represents I symbols when i = 0,..., log2(M)/2-1 and associated with Q symbols when i = log2(M)/2,..., log2(M)-1, comprising the steps of:

(a) if de-scrambling the modulated signals and if $B \leq |S|$, then S = sign (S) * $|B - \Delta|$, where Δ is a small non-negative number,

(b) determining if $s_i = 1$ for $i = 1,3$;

(c) setting S = -S if $s_i = 1$, else setting S = S;

(d) determining if $s_i = 1$ for i = 2,4 and if also $A \leq |S| < B$, then S = sign (S) * $|(A + B) - |S||$, else S = S; and

where: A = 0 and $B = 2D_1$.

4. A method for data scrambling or descrambling modulated signals, where s_i represents the scrambling code, S represents Q symbols when i = 0,..., log2(M)/2-1 and associated with I symbols when i = log2(M)/2,..., log2(M)-1, comprising the steps of:

(a) if de-scrambling the modulated signals and if $B \leq |S|$, then S = sign (S) * $|B - \Delta|$, where Δ is a small non-negative number,

(b) determining if $s_i = 1$ for $i = 1,3$;

(b) setting S = -S if $s_i = 1$, else setting S = S;

(c) determining if $s_i = 1$ for i = 2,4 and if also $A \leq |S| < B$, then S = sign (S) * $|(A + B) - |S||$, else S = S; and

where: A = 0 and $B = 2D_1$.

5. A receiver for data descrambling modulated signals, where s_i represents the scrambling code, S represents Q symbols with i being odd and I symbols with i being even, comprising:

a rake receiver; and

a data descrambler coupled to the rake receiver, the data descrambler performing the steps of:

(a) if $B \leq |S|$, then $S = \text{sign}(S) * |B - \Delta|$, where Δ is a small non-negative number,

(b) determining if $s_i = 1$, for $i = 0,1$, if i>1 skip to step (d);

(c) setting S = -S if in step (a) $s_i = 1$, else setting S = S;

(d) determining if $s_i = 1$, for $i \geq 2$ and if $A \leq |S| < B$,

letting $S = \text{sign}(S) * |(A + B) - |S||$, else S = S; and

where:

$A = 0, B = 2D_1$ for i = 2, 3;

$A = 0, B = D_1$, and $A = D_1, B = 2D_1$ for i = 4, 5; and

$A = 0, B = D_1/2$; $A = D_1/2, B = D_1$; $A = D_1, B = 3D_1/2$; $A = 3D_1/2, B = 2D_1$, for i = 6, 7, etc.

6. A receiver for data descrambling modulated signals, where s_i represents the scrambling code, S represents Q symbols with i being even and I symbols with i being odd, comprising:

a rake receiver; and

a data desrambler coupled to the rake receiver, the data descrambler performing the steps of:

(a) if $B \leq |S|$, then $S = \text{sign}(S) * |B - \Delta|$, where Δ is a small non-negative number,

(b) determining if $s_i = 1$, for $i = 0,1$, if i>1 skip to step (d);

(c) setting S = -S if in step (a) $s_i = 1$, else setting S = S;

(d) determining if $s_i = 1$, for $i \geq 2$ and if $A \leq |S| < B$,

letting $S = \text{sign}(S) * |(A + B) - |S||$, , else S = S; and

where:

$A = 0, B = 2D_1$ for i = 2, 3;

$A = 0, B = D_1$, and $A = D_1, B = 2D_1$ for i = 4, 5; and

$A = 0, B = D_1/2$; $A = D_1/2, B = D_1$; $A = D_1, B = 3D_1/2$; $A = 3D_1/2, B = 2D_1$, for i = 6, 7, etc.